R&D Scoping and Framing Workshop
R&D Roadmap: Managing Western Water as Climate Changes
February 20 and 21, 2008

Responsibilities, Challenges, and Needs
Perspectives of Reclamation Environmental Compliance and Ecosystem Restoration Managers

Note: The information presented herein is intended solely to facilitate a working level dialogue between the federal scientific community, and Reclamation water and environmental resource managers, on climate change research needs in support of Western water management. As such, "*this information has not been formally disseminated by the Bureau of Reclamation and should not be construed to represent any agency determination or policy*".[1]

Generally describe your region's environmental compliance and ecosystem restoration responsibilities *(this is meant to be a high level summary of your world):*

Most of our water diversion, storage, and delivery systems and hydropower generation facilities were built many decades ago. In many cases their construction and operation caused native fish habitat to be inundated and fragmented; some habitat became physically unavailable to migratory species. Even where habitat remains available its value to native species often is diminished through changes in flow-related attributes and processes caused by the continuing operation of our projects. For example, water temperatures are altered; migratory cues are disrupted; cottonwood regeneration is reduced; predator-prey relationships are changed; physical river channel and estuary renewal processes are modified.

In some cases it is also difficult to fully achieve applicable water quality standards given our project operating requirements.

Today we are responsible for complying with a wide range of Federal, State and Tribal environmental requirements in operating our projects. We generally try to reduce or compensate for adverse effects from our projects while continuing to operate them so as to maximize water and power benefits for human use. Where practicable we work with partners to restore important flow-related and other ecological processes and functions.

Describe the decisions that your region makes associated with environmental compliance and restoration responsibilities that may be affected by climate change:

We and numerous other Federal and state agencies, Tribes, and NGOs are highly engaged in salmon, steelhead, and bull trout restoration efforts in the Pacific Northwest. Restorative actions include releasing water from storage (or deferring storage) to supplement stream flows and in some cases to improve water temperatures; installing or replacing fish screens on diversions to prevent fish entrainment; providing or improving fish passage, typically through or around dams, to facilitate fish access to areas presently inaccessible or difficult to access; restoring spawning, rearing, migration, and other important habitats; controlling predators; and monitoring, research, and evaluation to facilitate adaptive management.

Decisions often focus on where and how to spend limited agency resources (dollars, people, etc.) to achieve the biggest restoration return on investment. For example, which of the many existing and potential spawning and rearing habitats in the Pacific

1/ Stated in accordance with Information Quality Act (Public Law 106-554), Final Information Quality Bulletin for Peer Review (Office of Management and Budget, December 16, 2004).

Northwest should be restored next? This involves consideration of biological potential (i.e., the potential to produce fish or things needed by fish). Traditionally we have determined potential by looking back in time at historic conditions and levels of production. But if climate change means that the biological potential of particular drainages (or elevations, or habitat types) will also change, we need to know this. We need to know where to invest our limited restoration resources based on the *future* biological potential of the streams and reservoirs in our region.

We need to know: will we be misallocating scarce public resources by restoring stream reach (or watershed) X to benefit species Y? Or will our investment there be more important than ever because of climate change?

What are the primary scientific or non-scientific factors that typically govern these decisions?

Scientific considerations generally include: species and habitat condition and trend information (e.g., species abundance, productivity, geographic distribution, etc.); limiting factors; restoration opportunities and physical/biological potential if restored; achievability of water quality standards; etc.

Non-scientific factors include: land owner/stream owner interest (Reclamation does not own or control most of the areas available for restoration); the interest of cooperating agencies and organizations; costs; technical feasibility; legal and regulatory authorities and requirements; availability of funds; competing priorities; water rights, water contract obligations, etc.

Who are the primary stakeholders affected by these decisions and summarize their primary concerns?

Water rights holders, Reclamation water contractors, and end users may be concerned about the loss of, cost of, and/or compensation for their right/ability to continue to make economically-beneficial use of water. Tribes, commercial and recreational fishermen, and environmental advocates may be concerned about the effectiveness of restoration efforts. Adjoining landowners may be concerned about effects to property values, land uses, and long-term liability for restoration improvements. Reclamation and other Federal agencies are concerned about sufficiency of compliance with the ESA, CWA, and other laws and the cost-effectiveness of our efforts.

In general, list the top three wishes that you would like for the scientific community to provide for you, in support of your region's environmental compliance and ecosystem restoration responsibilities that are related to understanding and utilizing climate change information.

Just answer these questions and we'll be happy:

1. **How will climate change affect the prospects, techniques, and priorities for restoration of aquatic ecosystems in the Pacific Northwest? (please focus on ESA-listed species and associated habitats affected by Reclamation projects)**

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2. **How will climate change affect the prospects for additional listings of aquatic species? Which currently-unlisted aquatic species in the Pacific Northwest are likely to be hurt the most by climate change?**

3. **In general, how will climate change affect river flows, reservoir volumes, biological productivity, temperature regimes, thermal stratification, and other biologically-important river and reservoir characteristics?**

4. **OK, OK, I know this is #4. For purposes of NEPA compliance and general planning, it might be nice to have the western states (then the U.S., then North America, then the world!) broken up into some sort of ecologically-relevant (maybe even socially and economically relevant) "climate change units." I envision starting with a map of "the west" with big pieces of geography delineated within which gross climatic changes are expected to be more-or-less uniform (or uniformly unpredictable), and more-or-less distinct from neighboring big pieces of geography. Then overlay, say, a biome map (or Bailey-Kuchler's map, or a map of major river basins). Now generally describe what climate change is likely to mean to each delineated subunit and the key ecosystems, economies, etc. within. I realize it's probably not possible to go very far with this sort of exercise, but it could be a useful way of organizing information (that can always be supplemented later) that we and other Federal agencies could use in addressing climate change and cumulative effects in our various NEPA analyses, and in planning for future water management needs. Just a wild half-baked thought.**

Are there current or emerging *"project-specific applications"* in your region where answers to these three wishes may be beneficial to you in the near-term?

Yes. We are currently working with EPA to develop a temperature TMDL for the Columbia River. Reclamation will be responsible for evaluating options for temperature management at Grand Coulee Dam and Lake Roosevelt. Some options may be very expensive to implement. How will climate change affect the thermal profile of Lake Roosevelt and thus potentially affect the management options to be considered?

Another example: we are almost constantly engaged in evaluating the effects of our project operations on listed species, and in modifying our operations (and in making other investments) to benefit those species. The information identified in Wish #1 above could be immediately useful throughout our region.

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